Table A1 Appendix, Internet repository
Samples studied in this work

Sample nu	Location	Description	Eruption year	Source	Comment
Gímsvötn					
G2004	Vatnajökull	tephra fall	2004	G. Larsen	
G1988	"	tephra fall	1998	G. Larsen	Ref. 13
96Gjálp	"	tephra fall	1996	G. Larsen	Ref. 13
G1983	"	tephra fall	1983	Museum of Natural History	Ref. 13
G1922	"	tephra fall	1922	Museum of Natural History	Ref. 13
BJ-II-5	"	tephra from glacier	ca. 1500	G. Larsen/M.T.Gudmundsson	Ref. 16
BJ-I-5	"	tephra from glacier	ca. 1450	G. Larsen/M.T.Gudmundsson	Ref. 16
BJ-0-6/EL	"	tephra from glacier	ca. 1200	G. Larsen/M.T.Gudmundsson	Ref. 16
Laki					
M4	Proximal tephra. See map in ref. 13.	tephra fall	1783	Th. Thordarson	Same sample as S4 in ref. 14
96-Laki	Lava tube 100m SW of Laki Hills	lava	1783	I.N. Bindeman	
L36	2 km SW from Laki Hills cinder/spatter cone	tephra fall	1783	A.T.Anderson	same sample analyzed by Muehlenbachs et al. (1974), ref. 15
L14	Laki Crater row, NW of Laki Hills	lava		A.T.Anderson	same sample analyzed by Muehlenbachs et al. (1974), ref. 15
L84	Laki lava field. See Fig. 1 of this paper	lava	1783	K. Gronvold	Ref. 14
L47	Laki lava field. See Fig. 1 of this paper	lava	1783	K. Gronvold	Ref. 14

Appendix. Melt inclusions in Laki eruption

Major element composition of melt inclusion compositions measured in this work (Table A2) complement those given in ref. [12], and provide record of changing melt composition during crystallization (Fig. A1). The concentrations of incompatible elements increase with progress of crystallization and decrease in MgO content (Table A2, Fig. A1); they demonstrate that it is close to the trends of either fractional or equilibrium crystallization. An initial compositions recorded by olivine tholeiite melt inclusions in Fo_{85} olivine (e.g. Metrich et al. 1991). The alternative explanation of glass composition trend is that of mixing with 5-15 wt% of ultra-low-$\delta^{18}O$ siliceous melt with 1.5-2.5 wt% K_2O, shown as straight lines on Fig. A1 is less likely, because mixing would yield higher K_2O concentrations in melt inclusions and interstitial glass. The second argument against mixing, is that even if the SiO_2 content of this siliceous endmember is dacitic (ca 62-65 wt% SiO_2), addition of only ~10wt% of this siliceous melt will make the SiO_2 in the resulting melt too siliceous (andesitic, rather than basaltic), see Fig.7 in text). This would contradict to the narrow compositional range of Laki's quartz tholeiite basaltic magmas, and subsequent Grimsvotn basalts.

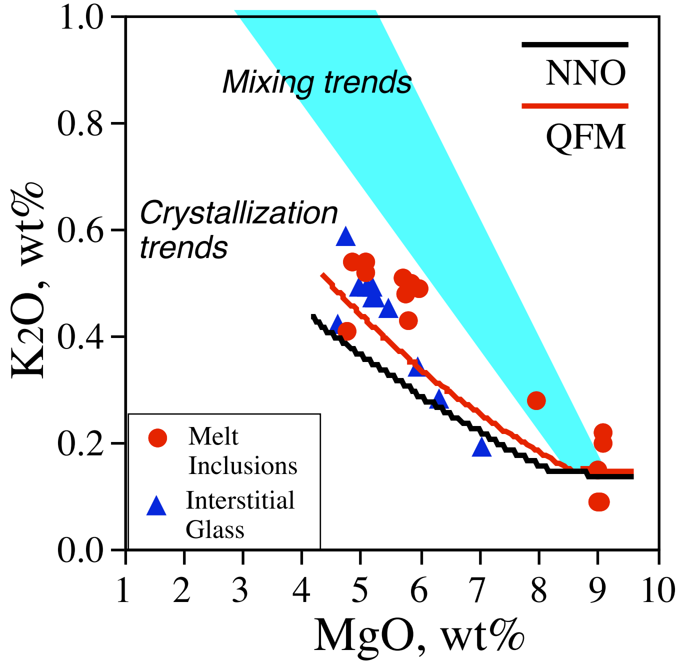

Fig. A1 Melt inclusion composition in olivine and plagioclase of this work and from Metrich et al. (1991, and composition of interstitial glasses (this work) with superimposed fractional crystallization trends, and mixing trendswith silicic K2O-richer melt

Table A2, Appendix, Internet Repository. The composition of melt inclusions, their host olivines, and and interstitial glass in Laki lava

Melt Inclusions

	Sample	Ol added	Fo	Ni, pp	SiO2	TiO2	Al2O3	FeO	MnO	MgO	CaO	Na2O	K2O	NiO	Cr2O3	P2O5	Totals	Mg#	K2O/TiC
96-Laki	Ol-0-3 Olivine, crystal 0		71.9	611	37.70	0.06	0.02	25.22	0.38	36.11	0.31	0.00	0.01	0.06	0.01	0.00	99.88		
	MI (4)				51.62	3.05	15.18	10.83	0.18	2.34	11.49	2.97	0.56	0.01	0.02	0.37	98.62		
	Ol-0	0.10			50.23	2.75	13.66	12.27	0.20	5.71	10.37	2.67	0.51	0.01	0.02	0.33	98.75	0.32	0.192
	stdev				1.45	0.29	0.63	0.35	0.02	0.52	1.48	0.58	0.06	0.01	0.04	0.03	0.50		
	Ol-5-core next to MI		71.7	778	38.11	0.07	0.04	25.01	0.41	35.52	0.29	0.00	0.03	0.08	0.00	0.01	99.57		
	MI(4)				53.82	3.09	15.67	9.01	0.16	2.17	11.33	1.87	0.58	0.00	0.00	0.37	98.09		
	Ol-5	0.08			52.57	2.85	14.42	10.29	0.18	4.84	10.44	1.72	0.54	0.01	0.00	0.34	98.21	0.32	0.189
					0.43	0.28	0.19	0.16	0.01	0.11	0.36	0.46	0.04	0.00	0.00	0.03	0.14		
	Ol-30-core		71.7	802	37.80	0.00	0.04	25.31	0.37	36.05	0.29	0.02	0.03	0.08	0.00	0.04	100.01		
	Ol-30-between MIs		72.0	877	37.79	0.01	0.03	25.00	0.40	36.02	0.28	0.00	0.02	0.09	0.03	0.02	99.70		
	MI (2)				50.88	3.37	13.96	11.93	0.22	2.63	11.65	2.88	0.54	0.02	0.01	0.38	98.48		
		0.10			49.57	3.03	12.57	13.23	0.24	5.97	10.51	2.59	0.49	0.03	0.01	0.35	98.60	0.31	0.162
					0.80	0.12	0.25	1.21	0.04	0.08	0.31	0.03	0.01	0.02	0.01	0.00	0.06		
	Ol-37 core		74.4	922	38.35	0.06	0.02	22.92	0.34	37.47	0.29	0.00	0.03	0.09	0.03	0.02	99.63		
					48.39	1.90	16.18	11.29	0.19	10.66	9.61	1.54	0.30	0.04	0.01	0.25	98.20		
	Ol-37 smallMI w bubble	-0.18			*50.60*	*2.30*	*19.72*	*8.73*	*0.16*	*4.77*	*11.65*	*1.87*	*0.36*	*0.03*	*0.01*	*0.30*	*97.89*	0.35	0.156
	Ol-37 smallM				52.82	3.55	16.07	9.81	0.21	3.10	11.72	1.67	0.54	0.05	0.03	0.43	100.00		
		0.08			51.67	3.27	14.79	10.86	0.22	5.85	10.80	1.54	0.50	0.05	0.03	0.40		0.35	0.152
	Ol-20 core		74.0	840	37.31	0.00	0.02	23.48	0.35	37.47	0.24	0.00	0.02	0.08	0.00	0.02	98.99		
	Ol-20 small MI				49.45	2.48	12.75	13.56	0.25	10.34	8.97	0.85	0.43	0.04	0.00	0.27	99.41		0.172
		-0.12			51.27	2.86	14.65	12.08	0.24	6.28	10.27	0.98	0.49	0.04	0.00	0.31	99.47		
	OL-X next-to-mi		72.2		38.71	0.003	0.04	24.85	0.400	36.223	0.32	0.00	0.020				100.56		
	MI(2)				51.93	3.03	15.30	9.76	0.17	2.74	10.88	3.28	0.58				97.68		
	Ol added	0.07		n.d.	51.00	2.82	14.24	10.82	0.19	5.08	10.14	3.05	0.54				97.97	0.32	0.193
	stdev				0.87	0.01	0.42	0.09	0.01	0.32	0.12	0.02	0.01				1.04		
	Olivine-37-1		72.9		40.57	0.582	2.05	22.02	0.335	33.274	1.68	0.50	0.090				101.13		
	Olivine-37-2		73.9		38.81	0.045	0.01	23.87	0.348	37.832	0.28	0.00	0.023				101.23		
	MI(2)				54.20	3.52	16.05	9.36	0.17	2.96	11.98	1.28	0.55				100.08		
		0.06			53.28	3.31	15.09	10.23	0.18	5.05	11.28	1.20	0.52				100.19	0.33	0.156
					0.15	0.04	0.17	0.05	0.02	0.00	0.04	1.10	0.01				0.75		

Interstitial Glasses

SiO2	TiO2	Al2O3	FeO	MnO	MgO	CaO	Na2O	K2O	NiO	Cr2O3	P2O5	Totals	Mg#	K2O/TiC
49.91	3.62	12.17	15.95	0.26	4.77	9.62	2.76	0.55			0.37	100.00		0.151
49.30	3.73	12.00	16.28	0.29	4.68	9.86	2.91	0.59			0.36	100.00		0.159
49.41	3.74	12.03	15.91	0.27	4.83	10.04	2.78	0.59			0.35	100.00		0.159
48.51	3.78	12.24	16.74	0.29	4.70	9.91	2.85	0.62			0.35	100.00		0.163
49.28	3.72	12.11	16.22	0.28	4.74	9.86	2.82	0.59			0.36	100.00		0.158

Average primitive melt inclusion from Metrich et al. (1991)

SiO2	TiO2	Al2O3	FeO	MnO	MgO	CaO	Na2O	K2O	NiO	Cr2O3	P2O5	Totals	Mg#	K2O/TiC
49.54	1.35	14.96	8.94	0.18	9.00	13.29	1.89	0.15			0.20	99.50		0.110